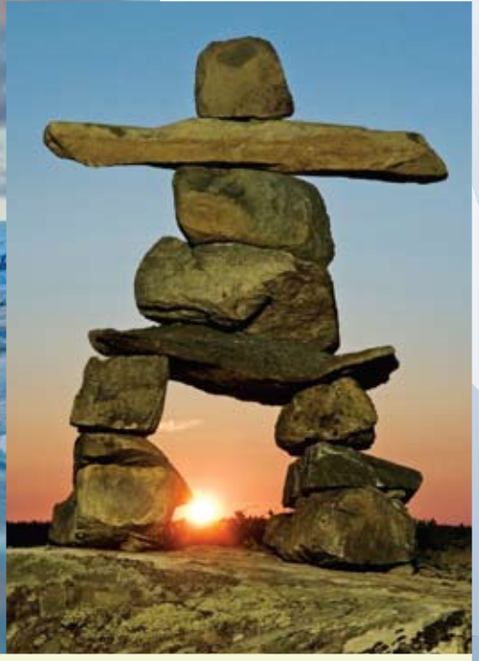
2011

Sharing Knowledge for a Better Future: Adaptation and Clean Energy Experiences in a Changing Climate

N.A.

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada



Sharing Knowledge *for a* Better Future

Adaptation and Clean Energy Experiences in a Changing Climate

Canada

Sea level rise research in Hall Beach, Nunavut

District heating system in Iqaluit, Nunavut

Examining erosion in Hall Beach, Nunavut

Solar project in T'Sou-ke First Nation, British Columbia

The Importance of Sharing Knowledge

Telling stories is a traditional way of communicating important messages for both Aboriginal and non-Aboriginal people across Canada. The stories in this publication highlight successful projects that have received a funding contribution from the current Climate Change Programs at Indian and Northern Affairs Canada (INAC). It is hoped that the stories in this publication will raise awareness in other communities about the steps that are being taken to mitigate and adapt to climate change. It is also hoped that these stories will inspire change in Aboriginal and non-Aboriginal communities across the country to take action on climate change and energy issues.

Past Climate Change Programs at INAC

- **2001-2003:**
  Aboriginal and Northern Climate Change Program (ANCCP)
- **2003-2007:**
  Aboriginal and Northern Community Action Program (ANCAP)

Current Climate Change Programs at INAC

- **2007-2011:**
  ecoENERGY for Aboriginal and Northern Communities Program

The ecoENERGY for Aboriginal and Northern Communities Program is one of eleven ecoENERGY programs funded by the Government of Canada. The main purpose of the ecoENERGY program is to reduce greenhouse gas emissions that lead to climate change. INAC's ecoENERGY program does this by funding Community Energy Plans, energy efficiency projects and renewable energy projects in Aboriginal and northern communities across the country. The ecoENERGY program also has a special initiative that focuses on assisting the approximately 150 off-grid communities across Canada that rely on diesel fuel for their energy needs.

- **2008-2011**:
  Climate Change Adaptation Program

The Climate Change Adaptation Program supports Aboriginal and northern communities, organizations, and territories in responding to challenges related to climate change. This program supports community planning and builds community capacity to undertake risk assessments, engage in water quality improvement and identify infrastructure issues linked to climate impacts. The program recognizes the importance for Aboriginal and northern communities to identify adaptation priorities and develop management strategies to increase their ability to adapt to issues such as melting permafrost, water management, food security, emergency preparedness, and infrastructure degradation.

INAC's Climate Change Programs play an important role in assisting Aboriginal and northern communities in adapting to the effects of a changing climate, in becoming more energy efficient and in developing sustainable forms of energy that lower greenhouse gas emissions that lead to climate change.

This document is the third success story publication by INAC's Climate Change Programs that highlights stories about successful adaptation and energy projects. All three publications are available on INAC's Climate Change website, found here: **www.ainc-inac.gc.ca/enr/clc/index-eng.asp**

This document was researched, written and designed by the Centre for Indigenous Environmental Resources (CIER) with participation from Aboriginal and northern community members and INAC staff.

Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Contents:

ecoENERGY Program Success Stories

T'Sou-ke First Nation, *British Columbia* > 2
Tla-o-qui-aht First Nation, *British Columbia* > 4
Kanaka Bar Indian Band, *British Columbia* > 6
Arviat, Baker Lake, Iqaluit and Rankin Inlet, *Nunavut* > 8
Swan Lake First Nation, *Manitoba* > 10
Ojibways of the Pic River First Nation, *Ontario* > 12
Hartley Bay, home of Gitga'at First Nation, *British Columbia* > 14
ecoENERGY Conclusions > 15
Updates on Past Energy Projects > 16

Climate Change Adaptation Program Success Stories

Champagne & Aishihik First Nations, *Yukon* > 20
Old Crow, *Yukon* > 22
Yukon College, *Yukon* > 23
Tlicho Communities, *Northwest Territories* > 24
Wagmatcook First Nation, *Nova Scotia* > 26
Sioux Valley Dakota Nation, *Manitoba* / Deschambault Lake, *Saskatchewan* > 27
Nunavut Climate Change Partnership, *Nunavut* > 28
Centre for Indigenous Environmental Resources, *Manitoba* > 30
Climate Change Adaptation Program Conclusions > 31

ecoENERGY Success Story 1

COMMUNITY INFORMATION:
Location: British Columbia, 36 km west of Victoria
2008 Population: 130 on reserve, 91 off reserve
Area (hectares): 67.2

CONTACT INFORMATION:
Phone Number: (250) 642-3957
Website: www.tsoukenation.com

PROJECT INFORMATION:
Projected Cost: $1.3 Million (Includes 37 solar hot water installations, 75 kW solar photovoltaic installation and an ongoing energy conservation program): Energy Conservation Program: $100,000, Solar Hot Water Installation: $300,000, 75 kW Solar Photovoltaic Installation: $900,000
Power Capacity: 75 kW Photovoltaic Installation
Projected GHG Reductions: 9 tonnes CO_2 annually (based on an average BC grid emission factor of 0.02 tonnes/MWh)
Resource Savings: Off-Grid: $9,400 annually
On-Grid: $1,170 in savings annually, plus annual revenue of $4,219 by selling power to BC Hydro

PARTNERS:
Indian and Northern Affairs Canada, British Columbia Department of Environment, Day4Energy, Government of British Columbia, Department of Energy Mines and Petroleum Products, Department of Small Businesses, Technology and Economic Development, Western Economic Diversification Canada.

T'Sou-ke First Nation

Energy Conservation Program, 37 Solar Hot Water Installations, 75 kW Solar Photovoltaic Installation

"We like to think of ourselves as Eco-Warriors, because we know that we have to go out and be assertive to get this message across. If we just do nothing, Mother Nature will show us where we've gone wrong." Chief Gordon Planes, T'Sou-ke First Nation

T'Sou-ke First Nation is on a quest to become a model of sustainable living for others to follow. The journey officially began in 2007 with an extensive visioning process they called *Visions in Progress*. This unique process took a full two years and involved every member of the community in non-traditional ways, such as linking visioning to sports days for the children, camping trips for youth with a youth council, and Elders' trips to the museum to see artifacts found on T'Sou-ke territory. The outcome was a vision of a self-sufficient First Nation living in harmony with the Earth. The process was so successful that when it was complete, the implementation of many of the initiatives outlined in the vision happened in less than a year. An example was the solar project, which included the installation of solar thermal units on members' houses and solar photovoltaic (PV) installations on the fisheries building, the band hall and the canoe shed. All this took less than five months to complete and has resulted in the largest photovoltaic installation in BC!

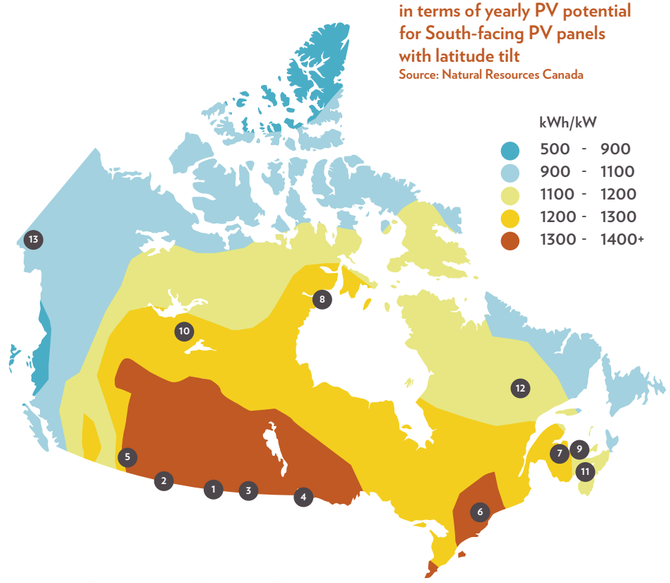
Solar Hot Water Panel Installation
Photo by: T'Sou-ke First Nation

Although they have evaluated the possibility of being completely off-grid, T'Sou-ke administration is currently operating at "net zero", meaning that they generate enough electricity to meet their own energy needs in the summer and sell the surplus to BC Hydro. In the winter they buy some of that energy back, for a net zero grid requirement on an annual basis. This means that they are essentially using the grid as a storage device, as opposed to using the energy that BC Hydro generates. Based on the $0.08/kWh that BC Hydro pays for electricity, generating solar energy is not currently as cost-effective as purchasing energy from BC Hydro, since it costs T'Sou-ke approximately $0.30/kWh to generate solar energy, based on a 20-year payback. However, T'Sou-ke sees this project as an investment for an uncertain future in which energy costs are projected to continue to rise, as well as an opportunity to address energy security issues, which are both issues the community has identified as being important to them.

From an environmental perspective, T'Sou-ke has determined through the visioning process that they want to find ways to return to a more harmonious and symbiotic relationship with Mother Nature. T'Sou-ke wants to lead the way in bringing other First Nations and the rest of Canada to a more sustainable energy future. In the true spirit of potlatch, the Aboriginal tradition of ceremonial gift giving and sharing, T'Sou-ke always shares the information they have learned. This was one motivation for a solar gathering they hosted in 2009. T'Sou-ke is currently working with BC Hydro to increase the feed-in tariff (i.e. the amount BC Hydro pays them for their power). They are also working with their 15+ funders, all of whom have different application and reporting requirements, on how to make funding sources work together to streamline the process for other First Nations that wish to build energy projects.

SOLAR MAP OF CANADA

The 13 "PV hotspots" in each province and territory in Canada in terms of yearly PV potential for South-facing PV panels with latitude tilt
Source: Natural Resources Canada



Community Capacity Building

Throughout this process, T'Sou-ke has made sure that its community members are being trained, rather than simply hiring external contractors to do the work. Between the solar PV, solar thermal and energy efficiency projects, they have had at different times over 25 community members working who may otherwise have been unemployed.

This capacity building was made possible through partnerships with First Power and Home Energy Solutions, two companies that developed oral training programs to teach solar installation skills in a way that was culturally sensitive to the learning style of many community members. As a result, not only does T'Sou-ke have the capacity to do over 90% of all solar maintenance in-house, some of the solar trainees have also been hired by Home Energy Solutions to continue working with them on other projects outside of the community. Further, T'Sou-ke has been approached by nearby Colwood Municipality to hire community members to work on a sustainable community development project. The First Nation is even having discussions with a local college to set up a solar panel design and manufacturing facility in T'Sou-ke.

"Start with energy efficiency. It's a lot cheaper to save energy than to produce it."
Andrew Moore, Solar Project Manager, T'Sou-ke First Nation

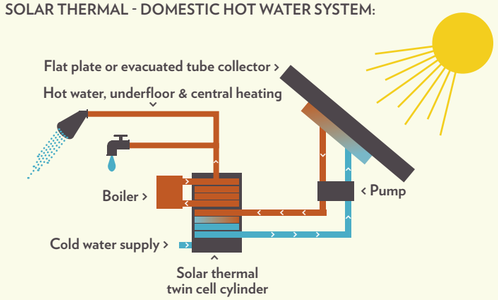
WHAT IS SOLAR THERMAL?

Solar thermal technology uses a solar collector to absorb the sun's energy and transform it into heat. A solar collector consists of a metal box with a glass or plastic cover and black absorber plates inside. These collectors can be classified as low, medium, or high-temperature.

Low and medium-temperature collectors are generally used to heat water or air in houses and other buildings. Cold water is pumped into the solar collector and is warmed by the sun. The hot water is then pumped back to the building (see diagram below).

High temperature collectors concentrate sunlight using mirrors to obtain higher temperatures. This technique is called "concentrated solar power" and uses steam or gas turbines to convert heat into electricity. This is different from solar PV, which converts solar energy directly into electricity using an inverter (see 'What is Solar Photovoltaic (PV)?' below).

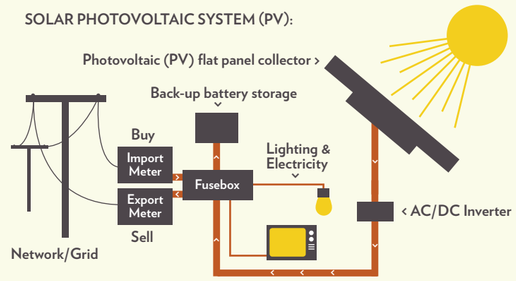
SOLAR THERMAL - DOMESTIC HOT WATER SYSTEM:



WHAT IS SOLAR PHOTOVOLTAIC (PV)?

Solar PV technology converts sunlight directly into electrical energy using PV cells, which are made out of semiconductor materials such as silicon. PV cells can be small (like those you've probably seen on a calculator) or can be connected together to form large PV modules. These modules can in turn be connected to form larger PV arrays. When light strikes the PV cell, the energy in the light is transferred to the semiconductor in the PV cell. This energy disturbs the electrons in the semiconductor, and moves them in a certain direction, creating an electrical current that can be tapped into for our electricity needs.

SOLAR PHOTOVOLTAIC SYSTEM (PV):



COMMUNITY INFORMATION:
Location: British Columbia, 300 km northwest of Victoria
2008 Population: 330 on reserve, 618 off reserve
Area (hectares): 321,000

PROJECT INFORMATION:
Projected Cost: $14 million
Power Capacity: 5.5 MW
Projected GHG Reductions: 9,000 tonnes of CO_2 annually

CONTACT INFORMATION:
Phone Number: (250) 725-3233
Website: www.tla-o-qui-aht.org

Tla-o-qui-aht First Nation
Run of River Hydro

"The more information you have, the better your end result will be, and the fewer costly surprises you'll encounter." Jamie Bassett, Director of Economic Development, Tla-o-qui-aht First Nation

Canoe Creek Hydro is a corporation with a conscience. Formed as a partnership between Tla-o-qui-aht First Nation (75%) and Swift Water Power Corporation (25%), the company's first development was a 5.5 MW hydroelectric project on Canoe Creek. This project generates enough energy to power about 3,000 Vancouver Island homes. The First Nation is now looking at developing two more sites: Winchie Creek (4.4 MW) and Haa-ak-suuk Creek (7.5 MW). These sites were chosen after a rigorous process that began with a preliminary investigation of the 8 to 10 creeks that had potential for hydroelectric development within Tla-o-qui-aht First Nation's traditional territory. These locations have been chosen for minimal fish interference, proximity to existing power lines, and short pipe requirements. The selection process took approximately 6 months and $30,000, which was provided by INAC's Aboriginal and Northern Community Action Program (ANCAP) of 2003-2007.

The Process
Once the decision was made as to which site to focus on, Tla-o-qui-aht First Nation began the permitting and energy purchase agreement process for the Canoe Creek hydro project. They applied to ecoENERGY and Aboriginal Business Canada for approximately $1 million in funding for the development of a business plan, as well as all the elements that negotiation of an energy purchase agreement entailed, including the interconnection study. According to Jamie Bassett, Tla-o-qui-aht First Nation's Economic Development Director, the First Nation wisely spent 15-20% on preliminary engineering studies, such as Lidar surveying (a surveying technique using laser digital technology), penstock layout, road design, geo-technical work and terrain stability analysis. These studies formed the basis of the business plan, and made future steps more fluid and reliable. Partially as a result of this up-front spending, the Canoe Creek hydro project is within 1% of the projected budget, and ahead of its completion schedule.

Solid Partnerships
According to Bassett, other elements that have been key to the success of the Canoe Creek hydro project have been the support from Indian and Northern Affairs Canada, and the solid partnership with Swift Water Power Corporation. The only hindrance to the process has been access to financing, which took almost a year due to the poor credit climate during the project's search for financing.

Bassett remembers that the initial idea for the Canoe Creek hydro project came from one Councillor, Ray Martin, who in the early 2000's said, "I think we should be looking at this". "That kernel of an idea to start the process is often all you need to get things moving, along with a Chief and Council who are prepared to stand behind the project from beginning to end," Bassett says. This includes financial commitment; Tla-o-qui-aht First Nation contributed significant bridge financing to the project before long-term financing was found.

Smart Investments
The Canoe Creek hydro project is not only a step towards energy and financial self-sufficiency for Tla-o-qui-aht First Nation. It is also a very deliberate investment in an opportunity to develop an energy project that does not deplete natural resources. In this way, the First Nation hopes to stay true to its vision of sustainability while fostering economic development within its community. In order to maintain consistency with its sustainable development ideals, significant environmental planning and research was conducted to ensure that the First Nation traditional territory is protected, including the Kennedy River watershed (within which the Canoe Creek project is located) and surrounding wildlife. For example, small roads, buried penstock, and strict creek level control will minimize environmental degradation. Tla-o-qui-aht First Nation's ultimate goal is to reinvest the profits from the Canoe Creek hydro project into other economic and social development programs. It wants to rebuild dwindling salmon stocks in the area and rehabilitate the local fish habitats, as well as explore other ways to generate clean energy. An example currently being explored is the development of a wind farm on a high plateau within the First Nation's traditional territory. Over time, the increasing demand for clean energy will provide the opportunity and the mechanism by which the First Nation will move towards self-sufficiency.

Canoe Creek
Photo by: Tla-o-qui-aht First Nation

Construction of Canoe Creek Hydro Project
Photo by: Tla-o-qui-aht First Nation

"Develop a relationship with a joint venture partner that you trust, and stick with it. If you want to move quickly, you'll need their expertise. But make sure they're experienced, as well as committed to the project."
Jamie Bassett, Director of Economic Development

WHAT IS RUN OF RIVER HYDRO?

Two types of hydroelectric projects are common: those created by storing reservoirs of water behind a dam and "run of river" hydro projects. Run of river hydro does not store large quantities of water behind a dam. It is dependent on the flow of water in a river for generating power. Hydro projects generate power by passing water that is under pressure through turbines. Run of river hydro develops this pressure by using drops in elevation.

In run of river hydro systems, a small dam or weir (about 1 to 3 meters high) is typically built across a waterway which directs the water in the river toward the "intake" point. After the water has come through the intake, it is channeled along canals, tunnels or pipelines that run both parallel to, and above the river, to a point downstream. At this point, the water is allowed to fall through a pipe or penstock down to the powerhouse where it spins turbines to create electricity. The water is then channeled out of the powerhouse so that it can rejoin the river.

Run of river projects are most cost effective when the water does not have to be channeled far from the intake before it can be used. In other words, the faster a river descends after the intake point, the better. An ideal situation would be to have a waterfall just downstream of the intake. Sometimes, in more mountainous regions, the project can dispense with the canal and simply send water down the penstock directly from the intake. In less mountainous regions, however, a canal may be built up to one kilometer before enough elevation is achieved to allow the water to drop into the powerhouse. A three to five meter drop is generally the minimum required for the smallest run of river hydro projects.

RUN OF RIVER HYDRO POWER SUMMARY

Description:	Diversion of part of a river's natural water flow through pipes and turbines to generate power and returning the unaltered water to the river downstream
Minimum Flows Required:	• 0.5-12 m^3/s (off-grid) • 12 m^3/s (on-grid)
Electricity Costs:	~5-20cents/kWh
Positive Features:	• 30-50+ year lifespan • Stabilizes long-term electricity costs • Grid connected sites can often be cost-competitive even without subsidies
Challenges:	• Reliability of year-round flows • Possible impacts on fish habitat • In northern regions, freezing and blockages may be a problem, especially at intakes and along slow flowing canals.

Source: *Aboriginal Energy Alternatives, Pembina Institute*

ecoENERGY Success Story 3

COMMUNITY INFORMATION:
Location: British Columbia, 18 km south of the Municipality of Lytton
2008 Population: 77 on reserve, 125 off reserve
Area (hectares): 134

CONTACT INFORMATION:
Phone Number: (250) 455-2200

PROJECT INFORMATION:
Projected Cost: $150 million
Power Capacity: 50 MW / 215,000 MWh
Projected GHG Reductions: 4,300 tonnes annually (This number is based on a 20-year lifetime and was calculated using the 2007 BC emission factor of 0.02 tonnes/MWh found in Canada's National GHG Inventory)

PARTNERS:
Kwoiek Creek Resources Limited Partnership (Joint Venture between Kanaka Bar Indian Band and Innergex II Power Trust Inc.), Indian and Northern Affairs Canada.

Kanaka Bar Indian Band
Run of River Hydro

"If somebody else can do it, why can't we?"
Patrick Michell, Kanaka Bar Indian Band Community Liaison

The Kwoiek Creek Hydro Project began with this question, stated above by Patrick Michell, Kanaka Bar Indian Band's Community Liaison. However, the journey from knowing that there was hydroelectric potential in the Kwoiek Creek (a tributary to the Fraser River) and wanting to harness it, to actually generating energy from a 50 MW run of river hydro project, has taken over 20 years so far. Patrick Michell says, "The band had a dream. Just not the financial resources and human capacity to execute it."

Persistence has paid off and from that dream was born Kwoiek Creek Resources Limited Partnership, an equal partnership between Kanaka Bar Indian Band and Innergex II Power Trust Inc. Forty years after the commercial operation date of the hydro project, Kanaka Bar Indian Band will become the sole owner of the hydro project.

The proposed project will divert a portion of the flow from Kwoiek Creek into a 7.2 km long buried steel penstock and return the water back into Kwoiek Creek after passing through the powerhouse which will be located on Kanaka Bar Indian Band's reserve land. Unlike conventional hydro projects, there will be no dam and no significant storage of water above the intake. A minimum flow level will be maintained within the bypassed section of the creek at all times to maintain fish and aquatic habitat. The project also includes an 80 km, 138 kV transmission line that will connect to a BC Hydro substation near Logan Lake, British Columbia.

Community Buy-In
Although Kanaka Bar Indian Band and Innergex II Power Trust Inc. are the owners of this venture, the project area lies wholly within the asserted traditional territory of the Nlaka'pamux Nation, which is comprised of 16 present day Aboriginal communities and 2 Tribal Associations. Six of the Indigenous communities' traditional watersheds are directly impacted by proposed new construction of civil works and the transmission line and two Indigenous communities are impacted by use of existing roads to access project work sites.

In order to get support from all the stakeholders involved, Kwoiek Creek Resources Limited Partnership established the First Nations Advisory Group where 7 of the 16 communities participated in a review of the hydro project and provided advice and guidance on the effects to the stakeholders of the project, especially the 80 km transmission line. Michell says, "For the communities of the Nlaka'pamux Nation, the Kwoiek Creek Hydro project represents an assertion of Indigenous rights, which is consistent with both Nlaka'pamux law and present day business practices and laws."

Environmental Assessment
In September of 2008, Kwoiek Creek Resources Limited Partnership submitted an application for a review of the hydro project impacts and mitigation plans under existing federal and provincial legislation and the 1994 Resolution regarding Nlaka'pamux resources. A harmonized review of the project was conducted by authorized agents at the provincial, federal and First Nation level with overall guidance of the process monitored by the Environmental Assessment Office in Victoria.

In March of 2009, a comprehensive report was produced by the Environmental Assessment Office, and an Environmental Assessment Certificate was issued by the province. A federal screening report followed in September. With the conclusion of the review and the issuance of these reports, final permitting for land occupation and water usage can be concluded with construction anticipated to begin in September of 2010.

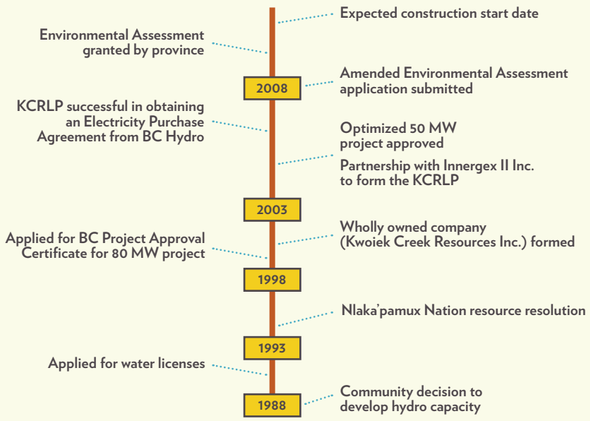
Present State of Kwoiek Creek
Photo by: Patrick Michell

Potential Benefits
According to the Kwoiek Creek Resources Limited Partnership, the project has the potential to provide significant benefits on a local, regional, and provincial scale. These include:

- Financial benefits to Kanaka Bar Indian Band;
- Direct employment of 70-90 workers during the two-year construction period, with priority placed on employment of qualified First Nation and local workers;
- Several long-term jobs for plant operators and watershed monitors with contracted maintenance and other required services during the 40-year operational period;
- Business opportunities related to the project construction and facility operation;
- Sufficient clean energy to supply the needs of approximately 22,000 homes;
- Greenhouse gas emissions reductions equal to removing 23,000 cars from BC's roads;
- Tax revenues for provincial and local governments.

"It takes time to do something right. There is no hurry as our lands, resources and people will still be here even after I am gone." Evelyn Michell, Community member

Kwoiek Creek Hydro Development Timeline



ecoENERGY Success Story 4

COMMUNITY INFORMATION:
Location: Nunavut

PROJECT INFORMATION:
Projected Cost: $14.5 million
Projected GHG Reductions: 4,650 tonnes annually
Resource Savings: 1.8 million litres of fuel displaced annually

PARTNERS:
Qulliq Energy Corporation, Indian and Northern Affairs Canada

CONTACT INFORMATION:
Phone Number: (867) 979-7524
Website: www.nunavutpower.com

Arviat, Baker Lake, Iqaluit, and Rankin Inlet
Extension of District Heating Systems

"Energy is not just electrical power, and we have to take advantage of all of the resources that are available to us in order to safely, reliably and efficiently provide energy to Nunavut." Kelland Sewell, Director of Engineering, Qulliq Energy Corporation

Qulliq Energy Corporation is owned 100% by the Government of Nunavut and is responsible for operating 27 diesel plants in 25 communities across Nunavut. Qulliq Energy Corporation is the only generator, transmitter and distributor of electricity in Nunavut. Qulliq Energy is responsible for providing power to all 26 communities in Nunavut that rely on diesel power for their electricity. Nunavut uses imported fossil fuels to generate electricity, heat its buildings and transport its goods and its citizens. This contributes to a situation of high fossil fuel dependency for the territory.

Identifying Efficiencies

In order to combat this CO_2 - heavy dependency, Qulliq Energy Corporation is trying to increase energy efficiency through the establishment of district heating systems. Currently, each community in Nunavut has its own independent electricity generation and distribution system consisting of individual diesel-generating plants. When these diesel generators burn fuel to produce electricity, they also create large amounts of thermal energy. This thermal energy is known as residual heat, or waste heat, and is expelled through the cooling and exhaust systems. Also called a combined heat and power plant, this system uses heat capture devices connected to the generators to transfer the residual heat into district heating systems through a network of pre-insulated pipes. This displaces fossil fuels that would otherwise be used for heating. This system is managed by energy transfer stations, which control, measure and transfer the required thermal energy to each building.

Scaling Up Impact

Thanks to ecoENERGY funding from Indian and Northern Affairs Canada, district heating systems have been implemented in the four Nunavut communities of Iqaluit, Arviat, Baker Lake, and Rankin Inlet. Benefits to these communities include up to 10% savings on customers' heating bills, reduced fossil fuel consumption and greenhouse gas emissions, a significant decrease in the need to upgrade fuel storage facilities, the reduction of transportation and handling of trucked fuel, and decreased boiler operation and maintenance costs due to extended equipment life.

"The next step for this project is to build on what we have learned and to see what other customers we can reach with the energy. We are also looking to improve the efficiency of our systems by improving on the combined heat and power plant to improve the quality of heat delivered."
Kelland Sewell, Director of Engineering

Fuel Storage Tanks in Iqaluit
Photo by: Daniel Van Vliet

Underground Pipes Carrying Heat from Iqaluit Generating Station
Photo by: Daniel Van Vliet

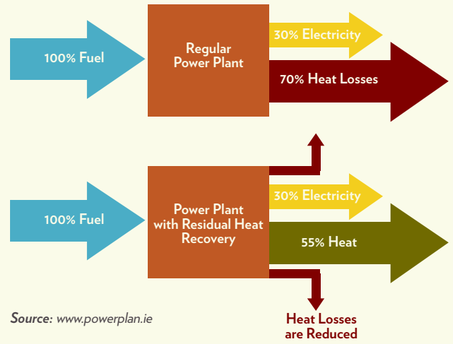
Insulated Pipes Providing Heat to a Community Building in Iqaluit
Photo by: Daniel Van Vliet

WHAT IS A DISTRICT HEATING SYSTEM?

In off-grid communities, electricity is most often produced by one or more diesel generators. These are convenient but inefficient ways of providing community power. Generally speaking, more than half the fuel burned in diesel generators is changed to heat, not electricity, and is lost out the exhaust. This heat is called **residual** or **waste heat**.

There are methods to recover this heat and put it to work so that diesel fuel is used as efficiently as possible. These methods go by names such as **residual heat recovery** or **waste heat recovery** and mean that technology captures the heat of electrical generation before it can escape. This heat is channelled through pipes filled with air, water or oil and is used for space or water heating in community buildings.

Combining the production of electricity and heat for useful work is called **cogeneration or combined heat and power**. When heat is produced in a central location and piped to different "districts" (to different buildings in a community), it is called **district heating**. Off-grid diesel generated electricity can often be made more than twice as efficient through a combination of cogeneration and district heating. The diagram below shows how this can work.



Source: *www.powerplan.ie*

DISTRICT HEATING SUMMARY

Description:	Uses a combined heat and power plant to generate power and heat and uses insulated pipes to distribute the heat to other community buildings.
Positive Features:	• 20-30 year lifespan • Can more than double the efficiency of the existing diesel generating system • Captures energy already in the community that is being lost
Challenges:	• Capital costs associated with the installation of piping infrastructure for the district heating system • Location of heat source (i.e. diesel generator) is often not close to potential loads (i.e. community members) • Systems are still dependent on fossil fuels, although they become much more efficient

Source: *Aboriginal Energy Alternatives, Pembina Institute*

ecoENERGY Success Story 5

COMMUNITY INFORMATION:
Location: Manitoba, 130 km south of Winnipeg
2008 Population: 711 on reserve, 498 off reserve
Area (hectares): 7,346

CONTACT INFORMATION:
Phone Number: (204) 836-2101
Website: www.swanlakefirstnation.com

PROJECT INFORMATION:
Projected Cost: $64,000 (for wind monitoring and data analysis)

PARTNERS:
Centre for Indigenous Environmental Resources, Indian and Northern Affairs Canada, Natural Resources Canada, Government of Manitoba

Swan Lake First Nation
Wind Monitoring and Data Analysis

"Our vision is to be completely off-grid by 2018. We know it's ambitious, but that's our goal." Council Member, Swan Lake First Nation

Swan Lake First Nation's wind development process began with an ideal – to become a more environmentally responsible community. Through hard work and perseverance, that goal is quickly becoming a reality. Swan Lake First Nation's first step was to consult with the community to gain support from all community members. Beginning in 2002 when the green visioning process began, a number of workshops and meetings were held and the community was overwhelmingly in support of this vision. Swan Lake First Nation began experimenting with renewable energy on a small scale. They installed solar panels and a 1.3 kW wind turbine in an off-grid youth camp and geothermal heat pumps in their health center and school. When southern Manitoba's 99 MW St. Leon wind farm development began just 10 km away, Swan Lake First Nation knew it had the wind resources required to make their vision a reality.

From Vision to Reality

In order to quantify this resource, Swan Lake First Nation undertook the task of installing anemometers, or wind towers, and collecting the necessary data over a 3-year period to develop a comprehensive wind analysis. With confirmation of the wind resource, the next step was to determine how much energy they wanted to generate. The community then engaged in more consultation and performed social, environmental and financial analyses of the effects of different sizes of wind farms. Swan Lake First Nation determined that with a 10 MW wind farm, not only will the community be able to generate enough energy for their own use, but they also have the possibility of generating profits by selling excess energy to Manitoba Hydro.

Next Steps

Since Swan Lake First Nation is looking at this project as an investment, the next steps prior to construction are to develop a business plan and negotiate a power purchase agreement with Manitoba Hydro. These negotiations will result in the establishment of the price at which Manitoba Hydro will purchase the energy produced, and will determine the project's economic feasibility. Environmental studies will also be conducted to ensure that all environmental impacts have been taken into consideration. Once complete, these steps will help pave the way towards the construction and commissioning of this project.

"One of the main benefits of the wind resource assessment and the installation of the solar panels and wind turbine at the youth camp has been getting the community on board with our green vision… when the wind monitors were up, I had people asking me all the time about our wind resources."
Bob Green, Director of Economic Development

Source: Canadian Geographic

50m wind monitoring tower, Remote Wind Energy Test Site, PEI
Photo by: Daniel Van Vliet

Steps to Planning and Building a Wind Farm

1. **Wind Assessment:** Wind speeds are measured to estimate how much energy a wind farm could produce.
2. **Wind Farm Design:** Wind data and topographical information are used to design the optimal wind farm, taking into account things like wind flow, turbine performance, sound levels, access roads, turbine foundations and local electric network, and the connection to the electricity grid.
3. **Environmental Study:** Environmental assessments are conducted to identify potential impacts on landscape, plants and wildlife, soil and water, land use or other activities such as aviation and telecommunications.
4. **Land Acquisition:** Developers usually approach landowners to negotiate agreements to use their land.
5. **Permitting and Public Consultation:** Municipal, provincial and federal permits, as well as community feedback and support, must be obtained.
6. **Economic and Financial Analysis:** The project must be economically viable in order to raise the funds to build the wind farm. In other words, the income generated from the energy production must be more than the cost of turbines and their installation and connection, as well as roads, electrical system, operation and maintenance, etc.
7. **Manufacturing:** Wind turbine parts are manufactured, and then shipped to the wind farm site where the final assembly will take place.
8. **Site Preparation:** Crews build access roads and clear the areas where turbines will be constructed. They then prepare the foundations; do the excavating, install the formworks, and pour concrete.
9. **Construction:** Once all components have been received, the assembly can take place. A crane is used to erect the tower and install the nacelle and rotor with its hub and blades. On the ground, the electrical collection network is installed and connected to the grid through the substation. Currently in Canada, the construction phase presents the best opportunities for local business and jobs. Other activities related to logistics, travel, lodging and material supply also generate significant additional local revenue.
10. **Commissioning:** The wind farm is tested before becoming fully operational.
11. **Operation and Maintenance:** A variety of skill sets are required to ensure the effective operation of a wind farm. The activities that have to be performed on a regular basis throughout the project's life include monitoring and analyzing performance, conducting environmental surveys and performing preventive maintenance and repairs on the turbines and other components of the facility.

Source: *Canadian Wind Energy Association (www. canwea.ca/farms/planning_e.php)*

ecoENERGY Success Story 6

COMMUNITY INFORMATION:
Location: Ontario, 25 km south of Marathon
2008 Population: 490 on reserve, 491 off reserve
Area (hectares): 365

CONTACT INFORMATION:
Phone Number: (807) 229-1749
Website: www.picriver.com

PROJECT INFORMATION:
Projected Cost: Run of River Hydroelectric: $15 million, Wind Monitoring: $181,000
Power Capacity: Run of River Hydroelectric: 6.1 MW (3.4 MW at High Falls and 2.7 MW at Manitou Falls), Future Wind Project: 24 MW
Projected GHG Reductions: Run of River Hydroelectric: 28,800 tonnes of CO_2 annually, Future Wind Project: 13,860 tonnes of CO_2 annually

PARTNERS:
Indian and Northern Affairs Canada, Brookfield Renewable Power (wind project), Innergex (wind project)
Hatch Energy (hydro and wind projects), Crupi Consulting (hydro and wind projects), Chant Construction (hydro project)

Ojibways of the Pic River First Nation

1. Run of River Hydroelectric Project

2. Wind Monitoring

"The vision that was adopted by Chief and Council in 1987 gave the community something to strive towards. Having maintained that commitment has resulted in the growth of our energy portfolio to what it is today." Byron LeClair, Director of Energy Projects, Pic River First Nation

Pic River First Nation's energy portfolio today boasts seven energy projects, ranging from feasibility phase to fully commissioned. These include five hydroelectric projects (High Falls, Manitou Falls, Umbata Falls, Twin Falls and Wawatay) and two wind projects (Coldwell and Superior Shores).

High Falls and Manitou Falls Hydro Projects

The High Falls and Manitou Falls run of river hydroelectric projects are the most recent additions to this impressive collection. Through a competitive site release process, the First Nation has recently obtained the development rights to these two sites along the Kagiano River. The Kagiano River is a tributary on the upper reaches of the Pic River, approximately 30 km north of Pic River First Nation.

Byron LeClair, Pic River First Nation's Director of Energy Projects, isn't wasting any time getting started, and the proposed projects are projected to be operational within five years. This takes into account two years for the environmental assessment process (to be conducted by Hatch Energy), one year for permitting and two years for construction. Site design and assessment is contracted to Chant Construction. The project has an anticipated commissioning date of April 2011, and will be owned by Pic River First Nation. This means that the community will control project revenues from the commissioning date, making it an important economic engine for the First Nation for the next 50 years.

Superior Shores Wind Project

Pic River First Nation is also investing in wind energy. Through a partnership with Brookfield Renewable Power, they are involved in the proposed 100 MW Coldwell wind farm (located northwest of Marathon), which passed environmental screening last fall. They have also received funding from INAC's ecoENERGY program to monitor and analyze the wind resources on Superior Shores, and thus far have completed a year's worth of wind testing. The wind data will be analyzed and then an environmental assessment will be performed. The site design and assessment for this project will be conducted by Innergex, and the financial analyst of both this and the hydro projects is Crupi Consulting. The end result of this project, if all goes according to plan, is the installation of 12 wind turbines with a capacity of 2 MW each, for a total capacity of 24 MW. The construction of this site is to begin in 2011 with commissioning predicted in 2012 or 2013. When completed, this project will have the ability to generate approximately 63 GWh of electricity per year.

Words of Wisdom

The 20-year energy development veteran Byron LeClair says, "I urge every community who is thinking about developing energy projects to start by securing the right to develop the project, then look for partners later. It's the most important step." Once that step is done, LeClair, who has been Pic River First Nation's Director of Energy Projects for over 20 years, further cautions First Nations, "Never lose control of your own development. We sold our interests in our first project, Black River, and we regretted it. First Nations should think long and hard about that because the asset is going to be there for a long time."

High Falls
Photo by: Byron LeClair

LeClair says that it's also critical for the Chief and Council to have a strong vision. In 1987, Pic River First Nation's Chief and Council decided that energy development was going to be a priority and they hired someone who knew how to execute that vision. However, he adds, it can't all come from leadership. The community must be engaged through strategic planning. Pic River First Nation has a unique strategic planning process that's very collaborative, resulting in project champions throughout the community who create a supportive environment for the investments they make.

Overcoming Obstacles

There have been many obstacles to overcome throughout the process. After seven energy investments, Pic River First Nation is much more knowledgeable about energy development. However, the process itself is still cumbersome and, according to LeClair, needs to be streamlined to make it more accessible. As an example, LeClair remembers that for the Umbata Falls project, even after receiving environmental assessment approval, there were still 68 other licenses that needed to be obtained before the project could go forward.

Further, since energy projects are so capital intensive, access to capital and how it's allocated is always an issue that needs to be addressed. LeClair says, "Of course there were other things that we could have done with our money. It's about allocating resources based on defined priorities. The First Nation should always have some capital invested in the project so that they can demonstrate both rhetorical (stated) and financial commitment. The capital trade-off, however, results in an asset that can last from 50-100 years. Chief and Council recognized the need to acquire a long-term source of revenue that the community itself could determine how it was spent."

TYPES OF JOBS NEEDED FOR HYDRO PROJECTS

On-site Job Opportunities

- Clerical/Site administrators
- Site security guards
- Site safety managers
- Site supervisors
- Foremen
- First aid attendants
- Quality control engineers
- Aboriginal relations coordinators
- Public relations coordinators
- Drivers
- Fire suppression experts
- Environmental laborers
- Environmental monitors
- Construction layout surveyors
- Legal surveyors
- Low-voltage electricians

Site Preparation

- Surveyors
- Fallers/Chokermen
- Skidder operators
- Logging truck drivers
- Cutblock layouts
- Silviculture technicians

Earthworks

- Surveyors/Gradesmen
- Dump/Rock truck drivers
- Drillers/Blasters
- Excavator/Dozer operators
- Loader/Grader/Crusher operators
- Laborers
- Snow removal operators

Penstock Installation

- Excavator operators
- Rock truck drivers
- Gradesmen
- Welders & helpers
- Pipe fitters

Concrete Works

- Batch plant operators
- Carpenters
- Iron workers/Rebar installers
- Crane operators
- Concrete truck drivers
- Concrete pump truck operators
- Laborers

Transmission Line

- Excavator/Skidder operators
- Linemen
- High-voltage electricians
- Laborers
- Fallers/Chokermen

Powerhouse Building

- Iron workers
- Crane workers
- Millwrights & assistants
- HVAC technicians
- Low-voltage electricians
- Laborers
- Plumbers

Building

- Iron workers
- Crane operators

Powerhouse Mechanical Works

- Millwrights/Millwright assistants
- Crane operators
- HVAC technicians
- Laborers

Business Opportunities

- Fuel supply providers/ deliverymen
- Heavy-duty mechanics
- Lodging/housing providers
- Food service providers
- Laundry/Cleaning service providers
- Solid/Human waste managers
- Material testing experts
- Automotive parts/repairs providers
- Lumber/hardware providers
- Steel fabricators
- Office rental/supplies providers
- IT/ Telephone providers

Source: *www.kwoiekcreekhydro.com*

ecoENERGY Success Story 7

COMMUNITY INFORMATION:
Location: British Columbia, 70 km southwest of Kitimat
2008 Population: 165 on reserve, 503 off reserve
Area (hectares): 128

CONTACT INFORMATION:
Phone Number: (250) 841-2500
Website: www.gitgaat.net

PROJECT INFORMATION:
Projected Cost: $600,000
Projected GHG Reductions: 180 tonnes CO_2 annually (assuming a 10% reduction in demand)
Energy Savings: $30,000 annually (assuming a 10% reduction in demand)
Resource Savings: 60,000 litres of diesel saved annually (assuming a 10% reduction in demand)

PARTNERS:
Pulse Energy, Indian and Northern Affairs Canada, Government of British Columbia Innovative Clean Energy Fund, Natural Resources Canada

Hartley Bay, home of the Gitga'at First Nation

Demand Side Management - Smart Metering Project

"We're in the middle of the Great Bear Rainforest, and there's a sacred duty to care for the planet and this area in particular." **David Benton, Project Manager, Gitga'at Nation**

Nestled deep within the Great Bear Rainforest, a remote off-grid community is using cutting edge technology to reduce its greenhouse gas emissions and to save money. In 2000, the small village of Hartley Bay, home of the Gitga'at Nation, decided to work with the Pembina Institute to develop a community energy plan. The plan, developed in 2003 with significant community input, indicated that Hartley Bay had ideal conditions for run of river hydroelectric energy generation. Before embarking on the energy generation project, the community decided to first reduce its energy consumption as much as possible. By decreasing its energy consumption and then developing its hydroelectric resources, the community could become independent from diesel energy for the majority of the year.

Hartley Bay worked with a company called Pulse Energy to design an innovative system that would provide real-time energy consumption information via wireless transmission from 100 smart meters installed in homes and public buildings. This information is critical as a slight reduction in diesel energy use can make a huge impact on cost and greenhouse gas emissions because it often means the difference between running one diesel generator or two. Hartley Bay, for example, has three diesel generators with a combined power output of 1MW. When energy use goes above the demand threshold of the first generator, the second generator automatically kicks in, creating a large amount of energy waste unless a significant amount of the second generator's capacity is required. This energy information, which is measured every 15 minutes, will give Hartley Bay's two new energy coordinators and community members the information needed to make smart decisions about energy use in the community.

Education is Key

Determined to make this a fully participative endeavour, the initiative was accompanied by broad community education, both at the youth and the adult level. A "Wait 'til 8" curriculum was delivered through the school, where kids learned about energy efficiency and then were encouraged to convince parents to wait until after 8:00pm to do laundry and dishes. Doing this helps to flatten the energy demand curve at certain critical times of the day. For adults, community meetings helped everyone to understand what the benefits of energy efficiency were, from both an environmental and a cost perspective. This gave people the level of comfort necessary to open their homes to teams of energy efficiency technicians, made up of Pulse Energy employees and the Band's own maintenance staff. These technicians carried out the energy efficiency retrofits that were recommended, such as weather-stripping, changing light bulbs to energy efficient light bulbs and insulating hot water tanks.

Exciting Results

Prior to this project, the community's energy bill was over $500,000 per year and constituted upward of 15% of the community's total expenses. All Band houses, buildings and infrastructure have now been retrofitted with smart meters. Projections indicate that if the smart metering can help the community reduce its energy consumption by just 5%, greenhouse gas emissions per year will be reduced by 90 tonnes. A 10% or 15% drop in energy consumption will result in a reduction of 180 or 270 tonnes of greenhouse gas emissions, respectively.

Words of Wisdom

- Starting with a community energy plan is key, because that will lay out the framework and show you how to get the biggest bang for your buck.
- Work with solid partners who understand the community's values and are willing to work within that system of values.
- Make sure that you're allocating enough on-the-ground resources within the community to ensure the feasibility of the project.
- Educate the community on how to use their appliances to decrease energy consumption and what they can do to reduce costs, save energy, and reduce greenhouse gas emissions.

ecoENERGY Conclusions

Truck with section of wind turbine base, Wolfe Island, Kingston, Ontario
Photo by: Amy Keuhl

Steps in Developing Renewable Energy and Energy Efficiency Projects

1. Develop a community energy plan that examines current energy uses, costs, future needs and opportunities for conservation and renewable energy.
2. It is always cheaper to use less energy than it is to develop new sources of energy! Look for ways to reduce wasted energy and improve the efficiency of the energy that is used.
3. Ensure that new buildings (both homes and community infrastructure) will be built as energy efficiently as possible.
4. Complete a pre-feasibility study to lay the economic groundwork for pursuing a renewable energy project. If it is positive, consult with the community about the opportunity.
5. Monitor the quality of the local resource in question and ensure that it is possible to access it for a long-term period.
6. Make sure that you can access the local electricity distribution system. Set up a business structure for buyers of the electricity in order to finance the project.
7. Obtain the necessary permits, including environmental impact studies.
8. Engage in construction and commissioning. Commissioning is the process used to test and verify that a facility or plant functions according to its design objectives or specifications.
9. Plan for operation, monitoring and maintenance well in advance.

Source: The Pembina Institute

Key Issues When Developing Renewable Energy

1. **Local Leadership and Engagement**
   One of the key factors in successful energy projects is that the local community is engaged early and often on its development, and that the goals of the project match the needs of the community.
2. **Monitor and Understand Your Local Resource**
   Renewable energy resources are dependent on the amount that is available at your site. It may sound obvious, but wind turbines need lots of wind and small hydro systems need consistent flows of water. These can vary with the time of day, the season and from year to year and will impact your economic return. Getting high quality and long-term data is essential before making decisions to invest.
3. **Explore Alternatives**
   In every community there are many different opportunities for energy alternatives that will save money and reduce energy consumption. Often the best project may not be the one you initially pursue.
4. **Use Only Proven and Cost Effective Technologies and Partners**
   There are many proven, reliable technologies for renewable and efficiency upgrades. Be wary of technologies and partners that do not have a long track record.
5. **Be Patient**
   Energy projects involve many jurisdictions and many people. They will therefore frequently span several years between when they are envisioned and when they are implemented. The goal is to develop long-term solutions, so it is key not to rush decisions on projects that will be on the ground for several decades.
6. **Look for Creative Funding Approaches**
   There are many Federal and Provincial programs that can lend support or be used to leverage other money.
7. **Be Persistent**
   Pursing alternatives may require some "outside of the box" thinking by you, your partners and your funders as it is a break from business as usual. Doing things differently than they have been done in the past can take some convincing. Don't give up!

Source: The Pembina Institute

Updates on Past Energy Projects

The following pages contain updates on energy projects that were featured in our 2007 publication titled *Reflections on Success*. For a copy of this publication, please email: ecoENERGIE-ecoENERGY@ainc-inac.gc.ca

1 Hupacasath First Nation

"A comprehensive community plan (CCP) was developed which gives this administration its mandate, so to speak... We asked what the community's wants and needs were as part of the CCP process, so anything we do as an administration is linked to the CCP."
Bob Duncan, CEO, Hupacasath First Nation

Hupacasath First Nation completed construction of their first hydroelectric project in 2005. Since then, not only has the project generated enough energy to power up to 6,000 Vancouver Island homes, but it also generates between $1.5 and $1.8 million per year in revenues. Over $1 million of that goes directly to Hupacasath First Nation. The venture is going so well that the First Nation is in the process of developing two new hydro projects. The first project, on the Tsable River, is an 8.5 MW project in partnership with Comox First Nation. The second, a smaller project along Robertson Creek, is 3.5 MW.

One lesson that Hupacasath First Nation learned during this project that will be applied to these next projects is to inject more equity into the venture. Bob Duncan's golden rule is: "he who has the gold, rules." He further elaborates that although much depends on ownership participation and structures, the project is generally most beneficial to those who contribute the most equity to the project.

2 Taku River Tlingit First Nation

"The most important message I can give to other First Nations is: you can do it. First Nations can hire the same consultants that anyone else can hire. They can secure financing. They can manage the process. There's no reason today for any First Nation to accept 1 or 2 or 5% ownership. You can be 100% owners of your energy projects."
Peter Kirby, President, Taku River Tlingit First Nation Corporation

The Taku River Tlingit First Nation run of river hydro project has been operational since April 1, 2009. A large celebration was recently held to commemorate the project's success and to celebrate the status of Taku River Tlingit First Nation as 100% owners of their hydroelectric project.

Although Taku River Tlingit First Nation is not grid-connected to the rest of British Columbia, it sells the energy generated from the hydro project to BC Hydro through an Energy Purchase Agreement which is distributed to the community of Atlin (pop. 500). Since the local grid only services Atlin, the entire capacity of the 2.1 MW system is not currently being fully utilized, as the community presently only requires between 0.5 MW (summer) and 1.2 MW (winter) of energy. The hydro facility was designed with enough capacity to meet local energy demand for the next 25 years as the Atlin population and demand for electricity grows.

"We own this, and when we're gone the community will still have this as a source of revenue for many years to come."
Peter Kirby, President of Taku River Tlingit First Nation Corporation

The process has taken eight years from conception. The first three years were spent studying the community's energy needs and performing pre-feasibility assessments. The next five years were spent working on the environmental assessment, project permitting and design, negotiating the Energy Purchase Agreement with BC Hydro, obtaining financing, and finally, in the last two years, construction.

As 100% owners of this project, Taku River Tlingit First Nation hired consultants to do much of the work. Culminex Inc. was hired to help with the financial analysis and Sigma Engineering for the technical aspects of the project. Arctic Construction was hired for the actual building of the project, along with over 25 community members for the duration of the construction phase. However, the project was managed exclusively by the two managers of the Atlin Tlingit Development Corporation, which is now being used as a platform to help other First Nations develop similar projects.

3 Skeetchestn First Nation

"Everyone in the community knows that we have geothermal that uses the Earth's energy to heat and cool the school building, and they're amazed by it."
Rod Ignace, Project Manager, Skeetchestn First Nation

On September 7, 2004, Skeetchestn Community School opened. The school's green design incorporated both passive and active energy saving technologies, most notably a ground source heat pump that keeps the classrooms warm throughout the winter. Natural gas is used to supplement the heating and cooling when necessary.

Although the community has not built any more green buildings, the focus over the last two years has been on retrofitting existing buildings with better insulation. Project manager for the school, Rod Ignace, says, "I'd say to other First Nations thinking about something similar, to incorporate as much renewable energy as possible. There may be some upfront costs, but it'll pay back quickly and then you'll be saving a lot."

4 Wha'Ti

"Using our old values in new ways to make wise choices for the future."
Wha'Ti Community Energy Plan

Following the Community Energy Plan that was developed in 2003, the Tlicho (Dogrib) people of Wha'Ti, Northwest Territories, determined that they wanted to reduce their dependence on fossil fuels for energy. Elders say that they have already seen changes on the land from the impacts of climate change, and the community wants to do its part to stop it. Wha'Ti decided to focus their energies in two directions: energy efficiency and a 12 MW run of river hydro project on the La Martre River, which they've called the Nailli Project.

Ongoing environmental studies are still in progress to ensure that there will be no adverse environmental impacts and Wha'Ti expects that this phase will be completed in about a year, at which point construction of the project will begin. This endeavor will provide them with ample hydroelectric energy to be 100% diesel-free. Once this is in place, all houses in the community will switch to electric heating.

Much progress has also been made on the energy efficiency front. Compact fluorescent light bulbs, hot water tank insulation, water saver faucets and motion sensor lights have been installed in all households and buildings throughout the community. Solar hot water units have been installed in a seniors' home as well.

According to Sonny Zoe, the project coordinator, most households have found that their average monthly energy bill has been reduced from approximately $250 per month to about $150 per month because of these energy efficiency retrofits. "This has really gotten the community on board with what we're doing, and they want to do more," says Zoe.

Updates on Past Energy Projects continued

5 Beaver Lake Cree Nation

"Solar energy has worked really well for us. The heating is consistent, and it saves us money. We would do it on all of our buildings, and although capital is always an issue, the payback is very good."
Tito Cayabyab, Beaver Lake Cree Nation Controller

In 2004, Beaver Lake Cree Nation completed a community energy baseline which recommended that the community install a SolarWall™ heating system in the new community centre that was under construction at that time. The Solar Wall™ is a renewable energy technology that uses solar energy to heat and ventilate buildings.

In 2007 the system was installed, and by 2009 the cost of the project had been completely paid off. The Solar Wall™ is saving the community over $8,000 per year (or about 30 to 40 percent of the centre's heating bills) over the 30-year lifespan of the wall. The technology is working so well that Beaver Lake Cree Nation has applied for funding to install Solar Walls™ in the health centre and treatment centre, as well as to replace the floodlights outside the administrative, health and treatment centres with outdoor solar lights. They are also hoping to retrofit the Old Hall, which is used for community gatherings, with better insulation and weatherizing, before also equipping it with a Solar Wall™.

6 Cowessess First Nation

"The most important things we've learned? You really get interested in the process of energy development, and learning about the possibilities… that there are real financial possibilities."
Lionel Sparvier, Director of Economic Development, Cowessess First Nation

Awasis Nehiyawewin Energy Developments Corporation is an energy development company owned by Cowessess First Nation. A partnership with TransAlta Wind is helping Cowessess First Nation reach its goal to have an ownership stake in a renewable energy project that can generate fiscal, social and environmental returns to the community for years to come.

The timing of Cowessess First Nation's initial year of wind data monitoring and analysis couldn't have been better, because it coincided perfectly with Saskatchewan's desire to move forward with green energy. This was one main driver for Awasis Nehiyawewin Energy Developments Corporation to develop a proposal for a 100 MW wind farm. In order to do this, Cowessess First Nation applied to Aboriginal Business Canada for funding to develop the business plan. The site that is currently under consideration for development is not the site that had originally been chosen for wind assessment. The location was changed after the wind assessment was completed because the site was too small and too close to the city to develop a large wind farm. The new site has now been analyzed, and Cowessess First Nation is gearing up for a request for proposals.

"If we had it to do over again, there's not much we could have done differently. If you're going to do something, take the challenge and do it, and don't worry about failure."
Lionel Sparvier, Director of Economic Development

There are many potential benefits from this project. This innovative partnership will serve not only as a demonstration that Saskatchewan is a high growth area with much potential for wind and other cutting edge industries, but will also serve as a role model for other First Nations interested in energy development. The project also creates sustainable power generation that adds to the capacity of the grid without the negative environmental impacts of other energy sources. Finally, this project has the potential to create many jobs for tradspeople and construction workers during the construction phase, as well as a smaller number of skilled technical positions during the operations phase, for which First Nations will be given priority consideration.

7 Rolling River First Nation

"You can't ask for anything better in an office complex. You get your heating in the winter, cooling in the summer. You can work comfortably all year."
Claude Shannacappo, Building Maintenance Staff, Rolling River First Nation

In the four years since the ground source heat pump was installed in the new health centre, it has had heating and cooling every day it was needed, according to Claude Shannacappo, Rolling River First Nation's building maintenance manager. Ground source heat pumps tap into the energy stored within the earth by using the ground's relatively constant temperature to provide heating, cooling, and hot water for both residential and commercial buildings. The ground source heat pump is one of the most efficient heating and cooling systems currently on the market. Heating efficiencies can be up to 70% higher than other heating systems, and cooling efficiencies can reach up to 40% higher than air conditioners. At about $60,000, the ground source heat pump has about a five to six year payback, and a lifespan of about 50 years. Shannacappo says, "I'd recommend the ground source heat pump based on our experience."

Ground Source Heat Pump Coils

8 Ojibways of the Pic River First Nation

"For us, investing in energy projects was a priority."
Byron LeClair, Director of Energy Projects, Pic River First Nation

Pic River First Nation currently holds over $400 million worth of renewable energy projects in various stages of development (seven in total). This considerable portfolio includes the following three operational projects: the 23 MW Umbata Falls hydro project on the White River, the 13.5 MW Wawatay project on the Black River, and Twin Falls, a recent 5 MW acquisition on the Pic River system. Until July of 2009, Pic River First Nation held a minority interest in Twin Falls, but they and the Union of Ontario Indians are now 100% owners of this $10 million project.

The First Nation started as a small minority partner in Wawatay which was the first project they were involved in. Work began on the Wawatay Generating Station 20 years ago, when the province approached Pic River First Nation to develop a hydroelectric dam on reserve land. They then graduated to majority owner of Umbata Falls, and are now the total owner of Twin Falls as well as the two other new projects they are in the process of developing – High Falls and Manitou Falls.

The largest of these projects is the $70 million Umbata Falls project, which began in 1991 when Pic River First Nation competed for and was awarded the right to develop the hydroelectric potential there. This project is owned by the Begetekong Power Corporation, a joint venture between Pic River First Nation and Innergex II, and funded in part by Indian and Northern Affairs Canada.

Construction projects like this one are good for the community's economy. Hydro projects are labour intensive to construct, and at Umbata Falls alone, more than 50 people were employed for the two years of construction - a significant percentage of the 490-member community. Two full time permanent jobs were also generated from the Umbata Falls project.

Over the years, these assets have generated more than just energy and jobs. According to projections, 109,000 tonnes of greenhouse gases will be reduced annually thanks to the Umbata Falls hydro project alone. Further, the revenues from these wise investments have been reinvested in the community, helping to pay for a 60-unit housing project and education programs.

Pic River
Photo by: Byron LeClair

9 Pic Mobert First Nation

"I'd recommend this to any First Nation. Just don't lose sight of what you want to do; don't let anybody tell you different. I think that by negotiating, we can get from point A to point B. If you're not getting what you want, step back; take a breather. I believe everything can be negotiated. You talk about it and you figure it out."
Wayne Sabourin, Pic Mobert Councillor

In March of 2005, Pic Mobert First Nation entered into a joint venture agreement with Regional Power Inc. to facilitate the development of two run of river hydroelectric sites along the White River. The joint venture is known as the Pic Mobert Hydro Power Joint Venture. Band Councillor Wayne Sabourin says, "It's a long process, and not an easy process. But we're 90% there." The next step is the completion of the Environmental Assessment. The project will be shovel-ready by spring of 2010, followed by 18-24 months of construction. The joint venture anticipates securing a 40-year power sale agreement through Ontario's new Feed-In Tariff Program.

"Pic Mobert First Nation is going to be here forever. We're not moving. You've got to look ahead... this is more for generations to come. We're going to lay the groundwork, and my grandkids are going to reap the benefits. Forestry's gone, mining's gone. These are the last natural resources that are left to us. I totally believe that any First Nation that has wind or water on its land should tap into this. If you have a goal and a plan, even without money, it'll come."
Wayne Sabourin, Pic Mobert Councillor

Pic Mobert First Nation owns the sites where the two projects will be, and has negotiated a 50% share of the joint venture. If Regional Power Inc. wants to sell its share of the venture in the future, the First Nation will have an opportunity to buy these shares.

Pic Mobert First Nation feels comfortable with its partnership with Regional Power Inc., a company 80% owned by financial giant Manulife. Sabourin cautions that when choosing a partner, First Nations should make sure they've done their homework and that they're partnering with a credible developer who can sustain the first few years of up front costs while the risk is still high. Pic Mobert First Nation also worked closely with a financial firm called Access Capital, who helped to make sure that the deal was fair and balanced, and would result in a viable project. According to Access Capital's 40-year projections, Pic Mobert First Nation will see several million dollars in revenue over the initial contract term. The financial benefits over the life of the project, which is expected to exceed 100 years, are substantial and unprecedented in the history of the First Nation. Sabourin comments that one major advantage of the hydro project is that the community will have money to invest in other businesses, and be more credit worthy with a $130 million project under its belt.

Adaptation Success Story 1

COMMUNITY INFORMATION:
Location: Yukon
Population: 2000 (comprised of 10 communities)

CONTACT INFORMATION:
Phone Number: (867) 634-2288
Website: www.cafn.ca

PROJECT INFORMATION:
A diverse group of over 230 people attended the workshop, resulting in building bridges and raising awareness between all levels of knowledge.

PARTNERS:
Champagne & Aishihik First Nations, Alsek Renewable Resource Council

Champagne & Aishihik First Nations

Climate Change in Our Backyard 2, Haines Junction, March 9-12, 2009

"We need to build awareness of how local, traditional and scientific knowledge is incorporated into studies. Too often research and monitoring studies are viewed as being done in isolation of meaningful community involvement." Rose Kushniruk, Champagne & Aishihik First Nations Community Lands Officer

The Yukon Government is currently in the process of building a climate change action plan for the territory. To ensure that local needs and observations are reflected in larger plans, Champagne & Aishihik First Nations (CAFN) and Alsek Renewable Resource Council (ARRC) formed a partnership to develop a series of workshops that would address these concerns. The first workshop, *Climate Change in Our Backyard 1*, was held in March 2006 in the community of Haines Junction. The second workshop, *Climate Change in Our Backyard 2*, was also held in Haines Junction in April 2009, and was attended by over 230 people. CAFN's climate change initiatives were inspired by a climate change workshop led by the Council for Yukon First Nations in 2004. At the close of this workshop, the question on everyone's mind was, "what are the next steps?" This series of local workshops attempted to provide direction and structure to climate change discussions.

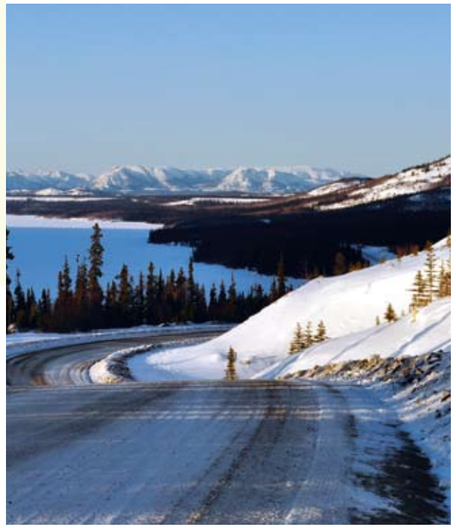
Strong Local Content

The workshop brought in experts with scientific, local and traditional perspectives on current issues related to climate change, as well as presentations on future scenarios that were specific to CAFN traditional territory. Presentations and discussion topics included: the spruce bark beetle infestation, changes in local hydrology and glaciers, health risks, changes in animals, food sources, and flora/fauna, as well as traditional stories of the area. With more information on these issues, decision-makers will be better equipped to assess and identify risks and opportunities these changes may bring, and will be better informed when making operational decisions. The information will also assist them in building on existing local emergency response plans as they experience changing landscapes.

Meaningful Community Involvement

This workshop brought together a wide audience and resulted in the participants having a better understanding of what current activities are underway, and how to further build partnerships within the community. Discussions sprang from the results of *Climate Change in Our Backyard 1*, and focused on how to continue to develop climate change adaptation initiatives in the community, while maintaining a high level of awareness of the importance of a climate action plan. Special attention was given to the involvement of youth in both the logistical planning and workshop attendance. Says Rose Kushniruk, coordinator of the event, "It was great to see INAC supporting this community-based project, it was a real showcase of climate change actions in the community."

Traditional Ice Fishing
Photo by: Tessa MacIntosh



Yukon Landscape
Photo by: Tanuja Kulkarni

OBSERVED CHANGES IN CLIMATE AND WEATHER INDICATORS
(COMPILED FROM INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 2007)

INDICATOR	CHANGE	COMMENTS
Air temperature	Increased 0.74°C Increased 0.13°C per decade	1906–2005 Rate (last 50 years)
Ocean temperature	Increased to depths of 3000 m	
Sea level	Rose 1.8 mm/ Rose 0.17 m	Rate (1961–2003) Total (1900–2000)
Snow cover	Declined	Northern Hemisphere
Mountain glaciers	Widespread retreat	Since 1900
Arctic sea-ice extent	Decreased 2.7% per decade	Rate (1978–2005)
Permafrost extent	Decreased by ~7%	Since 1900
Heavy precipitation events	Increased in frequency	
Droughts	Increased in intensity and duration	Since 1970s
Heat waves	Increased in frequency	
Tropical cyclones	Increased in intensity	Since 1970s

Strength in Numbers

This event combined forces with other Yukon First Nations, as well as non-First Nation partners. An easy-to-read final report was produced to provide information to CAFN and others so that they can begin to shape their own climate change planning processes. Kushniruk says, "We need to prepare the best we can. Community-based decision making is a must when establishing priorities for action. Who else knows this place better than us, the people who make the CAFN Traditional Territory their home?"

Kushniruk's impetus for developing this workshop stemmed from her previous role as Chairwoman for the ARRC. This role, which she held from 2000 to 2004, gave her the perspective that although "a lot of us grew up around each other, there was still a need for First Nation and non-First Nation communities to truly come together. Today, it is everyone's backyard, regardless of where we may come from. My ancestors were here for thousands of years and that is important, but today… our ancestral homeland is shared with others." Kushniruk realized that there are many diverse values towards the land and our communities need to come together, from commercial logging to cultural and spiritual beliefs. She summarizes the initiative by saying simply that "Climate change has no borders, it is an issue that affects us all regardless of who we are. This is a common issue that brings people together, regardless of... anything."

"This is our home, our backyard, all of us, we need to ensure that we all work together to understand what is happening to it. We need to coordinate our efforts for future projects. Having local people, managers and political leaders all under the same roof will add clarity."
Rose Kushniruk, Champagne & Aishihik First Nations Community Lands Officer

Adaptation Success Story 2

COMMUNITY INFORMATION:
Location: Yukon

CONTACT INFORMATION:
Phone Number: (867) 393-9200
Website: www.cyfn.ca

PROJECT INFORMATION:
A climate change risk assessment with 14 climate change indicators and adaptation plan that will better prepare Old Crow and other communities for climate change.

PARTNERS:
Council of Yukon First Nations, Vuntut Gwitch'in First Nation, Arctic Athabaskan Council, Northern Ecosystem Initiative (Environment Canada)

Old Crow
Climate Change Risk Assessment and Adaptation

"Climate change is having an unequivocal impact on the Arctic environment."
(Intergovernmental Panel on Climate Change, 2007)

The citizens of the Vuntut Gwitch'in First Nation and other residents of Old Crow, Yukon, are experiencing changes in temperature, water, flora, fauna and permafrost. These impacts, observed through both local and scientific methods, have affected people's way of life, culture, health, socio-economic structure and environment. The Old Crow Climate Change Risk Assessment and Final Agreement Analysis project attempts to address the community's concerns about a changing climate.

One tool that was examined as a potential framework and mandate for climate change adaptation planning was the Vuntut Gwitch'in First Nation Final Agreement. It was analyzed to determine if it was an appropriate instrument to address the risks of climate change and enable the community to design an adaptation plan.

The project examined how eleven communities have responded to climate change by performing targeted interviews, reviewing community strategic plans and current projects. Climate change was determined to be important at the discussion level, but did not yet have specific community policy developed around it. The main focus of this project was to conduct the initial stages of a climate change risk assessment and adaptation project for a single Yukon First Nation, Old Crow.

Old Crow Flats Region of the Yukon
Photo provided by: Natural Resources Canada

Dramatic Impacts
Cindy Dickson, Council of Yukon First Nations member and project manager, says, "Climate change is going to have an effect on our self government and final agreements. It is making it difficult for us to hunt, fish, trap, or gather plants and medicines; how is that going to affect our rights under our treaty? We decided to look at our umbrella final agreement to see what type of language might be in there to help the federal or territorial government realize that we were being affected by climate change and what, if there was anything, we could do in partnership to reduce those effects in our cultures."

Community-Led Research
The Vuntut Gwitchin First Nation (Old Crow, Yukon) was the first to respond and support the call for a partnership with CYFN to pilot this study. With the assistance from the members of the Hunters and Trappers Association, a questionnaire was developed that resulted in the identification of 14 indicators for climate change. The results were further discussed in a workshop. The participants used several methods to understand and group the ideas, and prioritize the issues, including fuzzy cognitive mapping that relied heavily on participant input. Existing adaptation measures used in the community were shared, as well as discussions on adaptation priorities for the future. The information was used to make recommendations for adaptation measures for the community. Dickson explains, "The difference with our risk assessment is that we didn't look at anything related to infrastructure. We mainly focused on food security issues and health. For example, what will happen if we have to switch from caribou to beef, which our bodies aren't adapted to? How will we supplement our diets if we don't have access to the same food anymore?"

The next step in the project, according to Dickson, is the implementation of some of the recommendations laid out in the assessment.

Adaptation Success Story 3

COMMUNITY INFORMATION:
Location: Yukon

CONTACT INFORMATION:
Phone Number: (867) 668-8772
Website: www.yukoncollege.yk.ca

PROJECT INFORMATION:
The objective of the Regional Climate Change Scenarios project is to provide the information required for the future development of regional Yukon climate change scenarios.

PARTNERS:
Council of Yukon First Nations, Yukon College, Yukon Government, Environment Canada

Yukon College
Building Regional Climate Change Scenarios

Development of climate change scenarios in the North is coordinated through the Yukon Climate Change Research Centre of Excellence; and partners Yukon College, Council of Yukon First Nations, and Government of Yukon, with the Canadian Climate Change Scenarios Network.

Climatic information for the Yukon has been difficult to collect. To date, information on average temperature, precipitation, snowfall, lake and river ice, and sea level has not been synthesized into a complete database available to governments, academia, industry, and the public. Without this information, it is difficult to develop accurate climate change scenarios that can help Yukon decision-makers make informed choices regarding adaptation to climate change. This project will provide a foundation for the development of regional climate change scenarios for the Yukon.

Bringing Stakeholders Together
According to Clint Sawicki, Coordinator of the Yukon College's Northern Research Institute, the most critical element in the project has been the development of the partnership. "The communication is there, so we know we're all working together towards the same end goal. Everyone's doing something different related to climate change, so it's important for everyone to start talking about what the potential is for getting all this data in the same place. People are starting to see the value of more regional level data", says Sawicki.

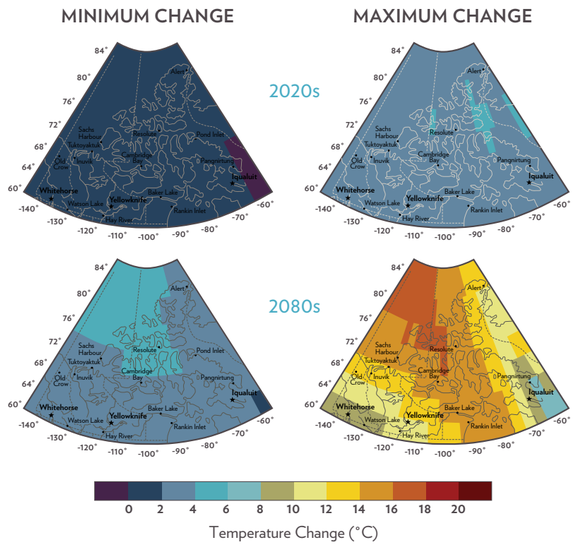
Historic and present climatic data will be collated to build essential knowledge required to develop accurate scenarios. Stakeholders, researchers, and industry will be contacted to build an inventory of raw data to be inputted into available scenarios. A working group, including the three project partners and Yukon stakeholders, will be created to ensure that the scenarios developed address scenario users' adaptation issues and priorities.

Accurate and meaningful indicators will be created and used to develop Yukon regional scenarios, based on available information and adaptation needs. The indicators used for scenarios will be decided both by the inventory of Yukon climatic data and by the needs of Yukon communities. These adaptation needs will be identified by synthesizing previous work, identifying community priorities, and working with potential scenario users.

Throughout the process, linking traditional knowledge with scientific data, and the representation of local knowledge will be important components of the work.

Widespread Communication
The technical elements of the project have enhanced access for Yukon researchers as well as storage for Yukon-based data and research. The node will support the impact and adaptation research needed to further efforts to respond effectively to climate change challenges.

The goal is to create scenarios of future climate that illustrate change over time to Northerners in a relatable way that transfers the knowledge between scientists, traditional knowledge holders, and decision makers.



Maps of Projected Changes in Mean Annual Temperature Over Northern Canada
Source: From Impacts to Adaptation: Canada in a Changing Climate. Government of Canada 2007

Adaptation Success Story 4

COMMUNITY INFORMATION:
Location: Northwest Territories

CONTACT INFORMATION:
Phone Number: (867) 392-3000
Website: www.tlicho.ca

PROJECT INFORMATION:
Development of community and regional climate change adaptation plans.

PARTNERS:
Ecology North, Northwest Territories Government, Tlicho Government

Tlicho Communities
Climate Change Adaptation Planning

"Climate change planning is not something you can do once every five years and then forget about. To be effective, we need to incorporate climate change in all community planning processes including financial planning, and where appropriate, in day-to-day decisions. If we don't try to manage impacts of climate change in our communities, they will surely manage us." Doug Ritchie, Program Director, Ecology North

NWT communities are already feeling the effects of climate change. The Tlicho government and Ecology North are partnering to develop individual climate change action plans for the communities of Wekweeti, Whati, Gameti, and Behchoko. These community plans will be knit together to develop a regional plan for the Tlicho.

"The Tlicho communities are ideal candidates to do this groundbreaking work on climate change because of the self-government agreement they signed in 2005", according to John Hazenberg, Tlicho Government. As a result of this agreement, the Tlicho Government has more autonomy, control, and ownership of traditional lands, flexibility to be involved in this type of initiative, and ability to add to the body of knowledge that will assist in developing a regional climate change plan.

Community profiles were developed for each of the four communities that outline basic statistics like demographics, language, employment, and geography, as well as infrastructure information on health, transportation, education, housing, electricity, food and water.

Community consultation was the first step in the development of the action plans and included Elder interviews and public meetings to identify concerns of the communities, current observations of climate change impacts, priorities for adaptation measures, and capacity. This information, coupled with relevant scientific research, informed the priority areas for their plans: water, invasive species, forest fires, and hazardous waste disposal.

Forest fires and hazardous waste disposal were identified as areas that should be acted upon immediately because they are currently detrimental to the communities' welfare, and are problems that will likely be magnified by climate change. For example, controlling the hazardous waste that goes into the Tlicho landfills is already a major issue for these communities. With increased temperatures, permafrost will become less stable, increasing the risk of hazardous waste leaching into water sources.

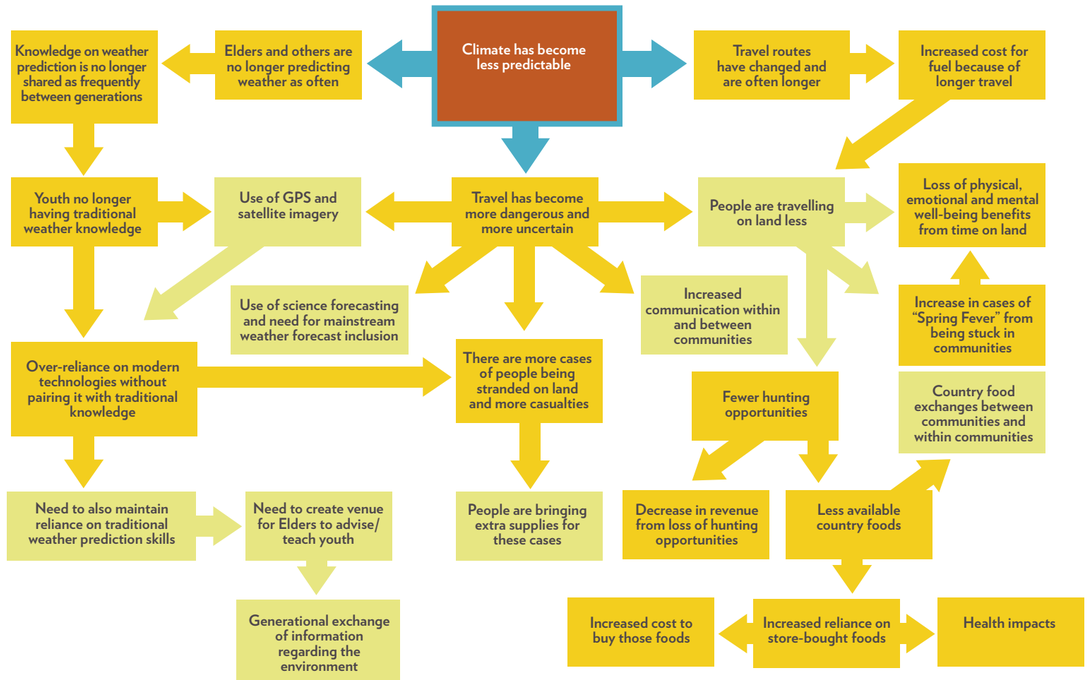
Regionally-specific information required to prepare strategies for water and invasive species is currently not available for Tlicho, but they are both important issues that resonate with the communities. Water will be monitored for quality and stream flow, and trends will be identified and tracked. A community-based monitoring program will be developed for invasive species identification, which may include encouraging hunters and trappers to document the changes they see.

Northwest Territories Ice Road
Photo provided by: Natural Resources Canada

Wekweeti Falls, Northwest Territories
Photo by: Tessa MacIntosh

Observation, Impact & Adaptation Diagram for all Regions - Unpredictable Climate

Key concern · Observation of environmental change · Impact on humans · Adaptation/Need for adaptation to occur/Recommendation



Source: Adapted from www.climatecaucus.net

Adaptation Success Story 5

COMMUNITY INFORMATION:
Location: Nova Scotia
Population: 710

CONTACT INFORMATION:
Phone Number: (902) 295-2598
Website: www.kinu.ns.ca/excellence/wagmatcook.html

PROJECT INFORMATION:
The objectives of this project were to examine the impacts of climate change on the Wagmatcook First Nation and review community planning.

PARTNERS:
Wagmatcook Culture and Heritage Centre, HMJ Consulting Limited

Wagmatcook First Nation
Adaptation to Climate Change Report

"Everyone hears about climate change, and we decided that we wanted to know more."
Nancy MacDonald, Project Coordinator, Wagmatcook First Nation

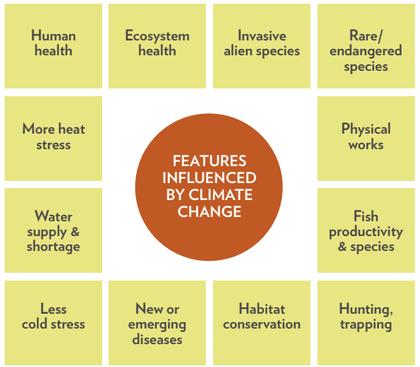
Wagmatcook First Nation (WFN) recognized the need to understand, prepare for, and be proactive in adapting to the expected impacts of climate change, especially those that will impact the infrastructure, resources, economy, and social conditions in WFN. As a result, the community decided to take action to incorporate adaptation planning into its community development strategy.

Through the increasing recognition of the applicability of the concept of 'two-eyed seeing'[1] in addressing ecological-based issues, the community sees an opportunity to use the combination of Indigenous and western scientific knowledge to address adaptation to climate change in a more holistic manner than what has been demonstrated thus far.

This project describes the potential impacts of climate change on Cape Breton, including changes in temperature, precipitation variation (including floods and droughts), sea level rise, salinity changes, extreme weather patterns, unpredictable wind speeds and storms, wave damage, habitat changes affecting wildlife and aquatic life, ecosystem changes and resilience, as well as socioeconomic impacts.

The Role of Traditional Knowledge

In the Cape Breton region, there is limited historical weather monitoring data. Therefore, traditional knowledge has particular importance in filling knowledge gaps, as well as providing insights into potential impacts and adaptive strategies that First Nations have experienced and used in the past. With that in mind, this study drew on oral knowledge, and contributed to the process of collaboration between western scientists and Indigenous communities to understand and address climate change issues. According to MacDonald, the community was highly involved, with Elders committee meetings held every month to talk about the project. Elders' voices played such an important role in this project, that a community documentary was produced highlighting the elders discussing climate-related changes that they have witnessed in recent years.



Source: Wagmatcook First Nation Climate Change Impacts and Adaptations Project Report

Raising community awareness on the climate change issue, with a special focus on long-term adaptation planning and monitoring has begun in earnest. MacDonald reiterates, "To me the real benefit of the project has been the learning experience, knowing more about the whole concept of climate change, how it affects the water, our traditional foods, our fish stocks. The community now really understands these concepts. They were talking about these things before, but maybe they were calling it something else. People have been seeing these changes; it just hadn't been called climate change".

The study also sought to better understand the impacts of climate change on community infrastructure. This process included identification of the appropriate adaptation for each class of structure, identification of building codes that need to be revised due to climate change, analysis of planning strategies used for adapting to sea level change, and an inventory of vulnerable structures and natural features with adaptive strategies identified.

The project analyzed the current community plan and capital plan, and identified several points of potential revision in order to incorporate adjustments to climate change.

[1] This term was used by Elder Albert Marshall of the Eskasoni First Nation to describe the integration of traditional knowledge and western science as a foundation for approaching issues within the natural world.

Adaptation Success Story 6

COMMUNITY INFORMATION:
Sioux Valley Dakota Nation
Location: Manitoba
Population: 1079

Deschambault Lake Community of the Peter Ballantyne Cree Nation
Location: Saskatchewan
Population: 821

CONTACT INFORMATION:
Phone Number: (204) 956-0660

PROJECT INFORMATION:
The objectives of these resources are to provide user-friendly and culturally appropriate guidebooks to help First Nations through planning to avoid, minimize, or adapt to impacts caused by climate change. The guidebooks outline a planning process and framework for decision-making that allows wide application, local adaptation, and on-going modifications.

PARTNERS:
Centre for Indigenous Environmental Resources, Sioux Valley Dakota Nation, Deschambault Lake

Sioux Valley Dakota Nation / Deschambault Lake
Series of 6 Guidebooks

"These guidebooks provide communities with a user-friendly tool to get started planning for climate change." Lisa Hardess, Project Manager, Centre for Indigenous Environmental Resources

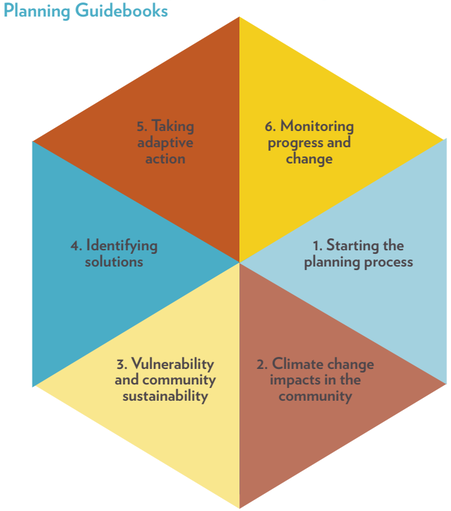
This series of six guidebooks outlines a planning process and framework for decision-making related to climate change adaptation. Not only is this a valuable tool for First Nations, the process used in the development of this project is an example of the power of innovative partnerships.

Community Support

The process relied on the strong working relationship that formed between the Centre for Indigenous Environmental Resources (CIER) and the two First Nations that worked on this project, Sioux Valley Dakota Nation and Deschambault Lake community of the Peter Ballantyne Cree Nation. The three partners worked closely to develop this tool, and the books were drafted parallel to the preparation, participation and follow up from community visits. CIER, together with the First Nation partners, developed community engagement approaches to the various steps in the planning process. Based on discussions with community members, activities were developed in working groups, schools, and with Elders, to come up with a six stage process which was tested in the two communities. The First Nations were then called upon again as a critical sounding board in the review and editing process of the guidebooks.

Since their development, CIER has presented the guidebooks at various conferences and workshops to increase awareness of the tool. This project has increased CIER's own capacity in the field of climate change adaptation and comprehensive community planning, and follow-up projects in both adaptation and planning have drawn heavily from this valuable experience.

Planning Process Diagram, Climate Change Planning Guidebooks



Source: Centre for Indigenous Environmental Resources

"The tool helps them to build their understanding and awareness of the steps to take action, and guides them through the process."
Lisa Hardess, Project Manager, Centre for Indigenous Environmental Resources

Adaptation Success Story 7

COMMUNITY INFORMATION:
Location: Nunavut

CONTACT INFORMATION:
Phone Number: (867) 975 7735

PROJECT INFORMATION:
Creation of several community adaptation plans, adaptation planning tools, collection of regional and local scientific knowledge.

PARTNERS:
Government of Nunavut, Canadian Institute of Planners, Natural Resources Canada, Ittaq Heritage and Research Centre

Atuliqtuq: Action & Adaptation
The Nunavut Climate Change Partnership

"This partnership supports planning in Nunavut and has been a great way to continue territory wide adaptation planning discussions. The information that has been collected has significantly strengthened the ability of communities to plan for change."
Froeydis Reinhart, Climate Change Coordinator, Government of Nunavut

A Multi-Faceted Approach Leading to a New Partnership

Nunavut continues to face serious climatic changes that have a direct and lasting impact on Nunavut communities. Advancing the knowledge of climate change in the territory and building community capacity is a priority.

The need for a multi-faceted approach to the changes facing Nunavut resulted in the formation of an innovative partnership. The Nunavut Climate Change Partnership integrates the local knowledge and overall vision of the Government of Nunavut, the planning expertise of the Canadian Institute of Planners, the cutting edge geoscientific knowledge of Natural Resources Canada, the resources and management of Indian and Northern Affairs Canada, and the on the ground presence of community researchers.

The different partner organizations worked collaboratively to support climate change adaptation in seven Nunavut communities: Clyde River, Hall Beach, Arviat, Cambridge Bay, Iqaluit, Whale Cove, and Kugluktuk. The series of projects and initiatives were structured around three central themes:
• building community capacity for adaptation planning;
• gathering regional, local, scientific and Inuit knowledge; and
• disseminating knowledge and best practices across Nunavut.

Community engagement was promoted by involving stakeholders and the community at large and by supporting the participation of such local institutions as hamlet offices and councils, local schools, the Ittaq Heritage and Research Centre in Clyde River, and the Nunavut Research Institute in Iqaluit. This ensured that the process used to gather information and develop adaptation plans, as well as the resulting policy recommendations, remain in the North.

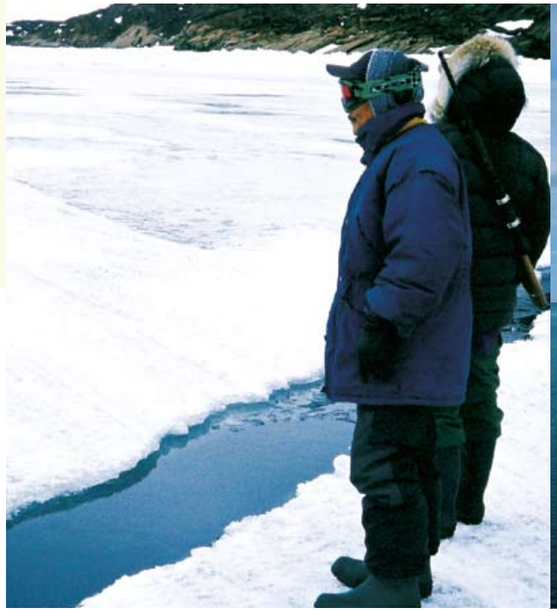
Building Community Capacity

"Working with the different partners has been a great experience because they've been so open to listening to us and taking our lead. This partnership has been very dedicated to doing this in as much of a participatory way as possible. Capacity has been created, and a certain level of awareness has been created that now leads to other spin off projects and will impact the community in ways that are difficult to even predict right now", says Jacob Gearheard, Executive Director of Ilisaqsivik Society, Clyde River.

In addition to community adaptation plans and climate change planning tools, a climate change teaching module will be developed to assist other Nunavut communities and organizations with adaptation planning. This will result in training and employment opportunities for Nunavut youth in climate change projects, as was demonstrated in several of the communities.

Gathering Regional and Local Knowledge

A critical component to this project's success was the inclusion of, and respect for, all types of knowledge, including both scientific and Inuit knowledge. Says David Mate, Natural Resources Canada, "Respect for other peoples' cultures and skills is an important aspect of working in such a diverse group, and that seemed to go a long way in making this partnership work. People took the time to listen to each other." The deliverables for this project encompassed scientific knowledge, such as watershed and drinking water supply analysis and arctic sea level rise assessment, but also emphasized the importance of working with elders and other local knowledge holders to identify and prioritize climate change impacts and adaptation actions, and has provided a working group to support community-based and Inuit research projects.



Inuit Hunters
Photo provided by: Natural Resources Canada

Arviat Landscape
Photo provided by: Natural Resources Canada

Disseminating Knowledge and Best Practices

Perhaps most important to the project's success is the dissemination of the knowledge that was generated and gathered through this initiative. Outreach strategies included the development of participatory climate change forums for Elders and youth throughout Nunavut, engaging Nunavummiut on locally relevant science and planning, and sharing information beyond the seven communities.

Toolkits will be created to engage additional Nunavut communities in adaptation planning and will support territorial initiatives. These will provide a model for communities who are at the beginning of their planning processes and offer relevant, useful examples.

Achieving Impact

The partnership used a broad spectrum of skills and expertise to make this project a success. Scientists worked at local and regional scales on such topics as permafrost monitoring, community permafrost and landscape hazard mapping, community watershed assessments, and sea-level rise and coastal erosion. Planners worked with the scientists to incorporate scientific data into their planning processes, and with the Government of Nunavut and local communities to develop community adaptation action plans.

"One of the most innovative aspects of this project has been the teaming of Nunavut decision-makers, Nunavut communities, planners and scientists working together, so that we can learn from each other" says Steven Brasier, Executive Director of the Canadian Institute of Planners.

By working together and sharing knowledge and resources, Nunavut continues to build community capacity, improve community planning, and support local learning opportunities. This process has increased Nunavut's ability to adapt to current impacts of a changing climate and better prepare for those that are yet to come.

Adaptation Success Story 8

CONTACT INFORMATION:
Phone Number: (204) 956-0660
Website: www.cier.ca

PROJECT INFORMATION:
The project seeks to increase the knowledge of climate change in Aboriginal communities in southern Canada. Risks to communities and how they interact with other challenges in the communities, and an assessment of how communities deal with the direct and indirect impacts of climate change, were identified.

PARTNERS:
Centre for Indigenous Environmental Resources, University of British Columbia

Centre for Indigenous Environmental Resources
Climate Change Adaptation Research Initiative

"The impacts of climate change can be felt in the environmental, social and economic well being of a community" Robin Sidneysmith, University of British Columbia Project Manager

Community decision making plays an important role in how the impacts are managed, and to what extent the community can prepare for those impacts. Successful adaptation is making decisions that consider the most appropriate option for a specific situation, and attention must be paid to feasibility, likelihood, and ability to apply the decision.

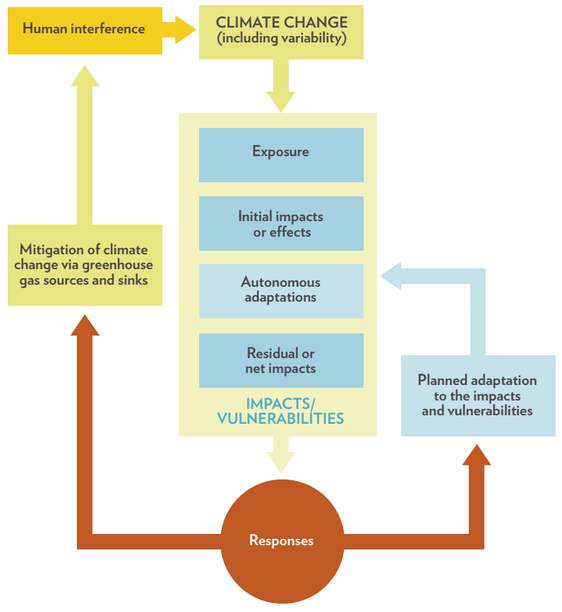
"There is considerable research being carried out in the North to understand climate change impacts and adaptation in Aboriginal communities, but very little is taking place South of 60º latitude. Aboriginal communities South of 60º are at risk to climate change impacts and this lack of attention may increase their vulnerability," says Amanda Karst, CIER Research Associate.

Natural resource dependent and Aboriginal communities are particularly vulnerable to climate changes, as agriculture, forestry, fisheries and hunting activities are affected by changes in temperature and precipitation. The economic impacts of climate change are significant, and subsistence lifestyles can be seriously affected. Compounding the problem, the adaptive capacity of many Aboriginal communities is eroded by social, cultural, political and economic changes taking place in response to stresses beyond climate change.

Understanding Adaptation
This project seeks to understand what the social elements of a community are that determine resilience or vulnerability in the face of any kind of change, whether it be environmental, political, economic, or social. CIER/UBC will work directly with Aboriginal communities South of 60º latitude through case study research to understand these elements. Little information is available about existing environmental impacts of climate change on southern communities or the ability of these communities to effectively respond to the impacts. This research gap increases the uncertainty about existing and future climate change impacts, which may put southern communities at greater risk.

The literature, methodologies and existing tools were reviewed and case studies will build on the information gathered. The First Nations of Chapple Island (Potloteck), Swan Lake and T'Sou-ke will be the focus of most of the CIER and UBC teams, while work in ten other communities: The Blood Tribe, Shoal Lake, James Smith, LaRonge, Haida Gwaii, Tsawwassen, Alert Bay (Namgis), Tseshaht First Nation and Montreal Lake First Nation will be completed in collaboration with other researchers.

Risk Management Framework



Source: From Impacts to Adaptation: Canada in a Changing Climate. Government of Canada 2007

Climate Change Adaptation Conclusions

Aboriginal and northern communities have recognized the importance of adaptation for dealing with climate change impacts. Many examples of current adaptation initiatives have been highlighted in the previous pages. These examples are promising indicators of the ability of Canadians to adapt their behaviour, activities and thinking to meet the challenge of climate change. They also demonstrate that adaptation encompasses a wide range of possible responses; and illustrates how individuals, community groups, the private sector and all levels of government can all play important roles in building a more resilient Canada.

Building Partnerships
Adaptation to climate change is a complex task that requires cooperation and support from many players. Building partnerships has been an effective way to address the multiple issues faced by communities. By teaming unique skills and perspectives brought by community members, government and science, decisions that incorporate adaptation issues can be made. As demonstrated in several of the projects, investing the time to build an effective partnership is time well spent, and will make adaptation efforts more successful.

Planning
Managing for a changing climate is an ongoing task that requires re-evaluation of decisions as the environment changes. It is important for communities to recognize that planning is only effective if the plans are regularly used and updated to include new and emerging information. Long-term planning exercises and decision making that considers how the conditions and priorities of the community evolve will result in stronger, more comprehensive community plans.

Using Communities Effectively
Successful adaptation to climate change engages communities as early as possible, and maintains their attention and input throughout the process. Braiding traditional knowledge and scientific information into community plans will provide a clear and balanced view of how climate change will impact communities. Planning processes need to facilitate continued community support and input in order to be as effective as possible.

Climate change planning is an important exercise, and benefits of larger scale planning activities can be felt at local levels. Aboriginal and northern communities are gaining the skills, knowledge and resources to adapt to climate change and are continuing to build adaptive capacity. These communities are addressing the challenges of climate change, and the path forward on adaptation will build upon current successes, strengthening and growing partnerships, engaging communities and continuing to plan effectively.

Caribou
Photo by: Tanuja Kulkarni